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EXAMINER	
CURTIS, CRAIG	

ART UNIT	PAPER NUMBER
2872	

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Please find below and/or attached an Office communication concerning this application or proceeding.

H'A

Office Action Summary	Application No.	Applicant(s)	
	09/843,597	MOSSBERG, THOMAS W.	
	Examiner	Art Unit	
	Craig Curtis	2872	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *01 November 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *39,41-50,64-66,75,81,82 and 85-136* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *39,41-50,64-66,75,81,82 and 85-136* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Disposition of the Instant Application

◦ This Office Action is responsive to Applicant's Amendment filed on 1 November 2004, which has been made of record in the file.

◦ By this amendment, Applicant has amended claims 39, 41, 50, 64-66, 75, and 81 cancelled claim 40, and newly added claims 85-136.

◦ Accordingly, claims 39, 41-50, 64-66, 75, 81, 82, and 85-136 are presently pending in the instant application, claim 40 having been cancelled via the present amendment for the purpose of obviating a rejection of this claim under 35 U.S.C. § 112, second paragraph, asserted in the outstanding non-final Office Action; and claims 1-38, 51-63, 67-74, 76-80, 83, and 84 having been cancelled by the present amendment in view of their having previously been identified as being drawn to non-elected inventions.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

1. **Claim 39, 41-50, 64, 75, 85-92, 94-95, 102-111, 113-118, 120-130, and 132-136 are rejected under 35 U.S.C. 102(b) as being anticipated by Kenan et al. (4,006,967).**

With regard to claim 39, Kenan et al. disclose the invention as claimed—[a] method [see entire document: for example, Figs. 1-6, claims 1-23, and otherwise as

specifically set forth below] comprising dynamically configuring a configurable programmed holographic structure [see Fig. 1 and column 5, lines 20-67 to column 6, lines 1-67 to column 7, lines 1-13] comprising a set of diffractive elements [namely, Bragg grating 15] and at least one optical port [see, e.g., beam 11 in Fig. 1, the presence of same in said configurable programmed holographic structure 10 implicitly necessitating an optical port; also see, e.g., prism couplers 57 and 58 depicted in Fig. 3] by introduction of energy [via, e.g., electrodes 18 & 19, 23 & 24, etc.] to the configurable programmed holographic structure [see, e.g., Figs. 1, 2, and 4], thereby modifying at least one optical characteristic of the configurable programmed holographic structure [see, e.g., column 4, lines 53-58], wherein:

the diffractive elements of the set are collectively arranged, before or after configuring, so as to comprise temporal, spectral, or spatial transformation information [implicit given the provision of Bragg grating 15],

each diffractive element of the set is individually contoured and positioned, before or after configuring, so as to reflectively [alt. *diffractively*] image at least a portion of an input optical signal between an input optical port and an output optical port as the input optical signal propagates within the holographic structure [cf. especially beams 11 and 12 and 13 in Fig. 1],

the diffractive element set transforms, before or after configuring, the imaged portions of the input optical signal into an output optical signal according to the transformation information as the optical signals propagate within the holographic structure between the input optical port and the output optical port. *Id.*

With regard to claims 41 and 122, Kenan et al. further disclose wherein the energy is introduced through a conductive trace, the trace coupled to the configurable programmed holographic structure. See especially the [interdigitated] spaced electrodes 16 and 17 depicted in Fig. 1; also see column 5, lines 38-46].

With regard to claim 42, Kenan et al. further disclose wherein the modified optical characteristic is an index of refraction of a diffractive element. Please see especially column 4, lines 53-58.

With regard to claims 43 and 44, Kenan et al. further disclose wherein the configurable-programmed holographic structure further comprises a plurality of segments, each segment comprising at least one diffractive element, each segment comprising an average index. Please see the *average index of refraction* language used by **Kenan et al.** in line 58 of column 4.

With regard to claim 45, Kenan et al. further disclose wherein each segment comprises a spatial structure. This limitation is at least implicitly met by **Kenan et al.'s** disclosure that the index of refraction regions constituting said Bragg grating necessarily vary—an observation that implies that differing structural properties can reasonably be associated with each segment of said Bragg grating.

With regard to claim 46, Kenan et al. further teach that said dynamic configuration is effected by changing the spatial structure of at least one segment [which, incidentally, is the minimum change effected upon said Bragg grating of **Kenan et al.**].

With regard to claims 47 and 127, Kenan et al. further teach wherein the configurable programmed holographic structure further comprises at least one gap comprising a material having a refractive index [please see, e.g., any one or more of the

regions between adjacent segments of Bragg grating 15 depicted in Fig. 1], the at least one gap situated between two adjacent segments, the energy introduced coupling with at lest one gap to effect dynamic configuration, as set forth hereinbefore.

With regard to claim 48, Kenan et al. further teach wherein the energy introduced is to change the refractive index of the material. Please see column 4, lines 53-58.

With regard to claim 49, Kenan et al. further teach wherein the energy is supplied through at least one conductive trace coupled to the at least one gap. Please see Fig. 1.

With regard to claim 50, Kenan et al. implicitly teach wherein a segment comprises a plurality of sub-segments each of which comprises an index of refraction [this limitation, incidentally, being met by **Kenan et al.** even in the event that said recited sub-segments are contiguous and possess identical indices of refraction], and wherein the energy introduced coupling with at least one sub-segment is to effect dynamic configuration. Please see comments made above.

With regard to claim 64, please see Fig. 3, in which is depicted a configurable programmed holographic structure 14 [comprising the elements depicted therein] that routes at least a portion of an optical signal between at least one chosen first optical port [viz., the entrance point of, say, input read beam 59 into input coupling prism 57] and at least one chosen second optical port [viz., the exit point of, say, output beam 64 from output coupling prism 58], the configurable programmed holographic structure comprising a set of diffractive elements [please see Bragg grating 15],

the diffractive elements of the set being collectively arranged, before or after configuring, so as to comprise temporal, spectral, or spatial transformation information [implicit given the provision of Bragg grating 15],

each diffractive element of the set is individually contoured and positioned, before or after configuring, so as to reflectively [alt. *diffractively*] image at least a portion of an input optical signal between an input optical port and an output optical port as the input optical signal propagates within the holographic structure [cf. especially beams 59 and 64 in Fig. 1],

the diffractive element set transforms, before or after configuring, the imaged portions of the input optical signal into an output optical signal according to the transformation information as the optical signals propagate within the holographic structure between the input optical port and the output optical port. *Id.*

With regard to claims 75, 121, 128, and 134, Kenan et al. at least implicitly disclose wherein energy is applied in a time-varying manner to said configurable programmed holographic structure comprising a set of diffractive elements [please see pulse generator 52] and at least one optical port [see, e.g., Fig. 4], the diffractive elements of the set collectively defining a set of program characteristics [as set forth above], at least one of which varies with energy applied to said configurable programmed holographic structure [viz., the average index of refraction within said configurable programmed holographic structure], thereby varying the set of program characteristics in a time-varying manner [*id.*], as well as [implicitly] wherein the resulting signal is a modulated optical signal that is modulated in a time-varying manner and provided at an output port [please see column 8, lines 20-28], wherein;

each diffractive element of the set is individually contoured and positioned so as to reflectively [alt. *diffractively*] image at least a portion of an input optical signal

between an input optical port and an output optical port as the input optical signal propagates within the holographic structure [see Fig. 4],

the diffractive element set transforms the imaged portions of the input optical signal into the modulated optical signal according to the time-varying set of program characteristics as the optical signals propagate within the holographic structure between the input optical port and the output optical port. *Id.*

With regard to claims 85-89, 105-108, 110, 115, 118, and 130 Kenan et al. at least implicitly disclose wherein said diffractive elements of the set are collectively arranged so as to exhibit positional variation in at least optical separation [claim 85], based on the change in index of refraction [optical path length being a function of refractive index]; the same being the case, necessarily, with regard to the exhibition of altered positional variation in at least optical separation after configuring [claims 86, 105-108, 115, 118, and 130]; the diffractive elements comprising the Bragg grating taught by Kenan et al. necessarily transforms [even before configuring—assuming, that is, that said Bragg grating has been written in said configurable programmed holographic structure] the imaged portions of the input optical signal into the output optical signal according to the transformation information inherently contained therein [claims 87-89, 110], the altered output optical signal in each case differing from the output optical signal in spatial wavefront [with respect to at least the directionality of same—i.e., wave vector—if not with respect to shape, optical spectrum being likewise altered due to the dependence of same upon refractive index—i.e., dispersive effects].

With regard to claim 90, the beam angle modifying teachings of **Kenan et al.** necessarily encompass the option of steering said output optical signal such that it not exit from configurable programmed holographic structure. Please see, e.g., Figs. 1 & 2.

With regard to claim 91, the diffractive element set teachings of Kenan et al. serve, when desired, to transform, after configuring of same, the imaged portions of the input optical signal into the output optical signal according to the transformation information as the optical signals propagate within the holographic structure between the input optical port and the output optical port. Please see, e.g., Fig. 1.

With regard to claims 92, 109, and 111, inasmuch as before [or after, for that matter] configuring is effected an input signal could be absent, or not yet applied, such instance necessarily would result in said output optical signal being substantially absent before configuring.

With regard to claim 94 and 113, the input and output optical ports taught by **Kenan et al.** comprise distinct optical ports. Please see, e.g., the relevant region of coupling prims 57 and 58 in Fig. 3.

With regard to claims 95, 114, 116, 129, and 133, the holographic structure of **Kenan et al.** comprises, as depicted in, e.g., Fig. 1, a planar waveguide that substantially confines in one dimension the optical signals propagating in two dimensions therein.

With regard to claim 102, Kenan et al. explicitly teach wherein the energy introduced is electrical energy. Please see, e.g., column 5, lines 30-37.

With regard to claims 103, 123, and 135, Kenan et al. explicitly teach wherein at least one conductive trace is positioned and contoured so as to substantially correspond

to one of the diffractive elements. Please see Fig. 1, especially 16, 17 w/r/t Bragg grating 15.

With regard to claims 104, 117, 124, 125 and 136, Kenan et al. explicitly teach wherein said energy is introduced through multiple conductive traces, the multiple conductive traces comprising at least two subsets, the energy introduction through each subset of the multiple conductive traces being independently controlled. Please see Fig. 1, especially 16, 17, each of which are independently controlled (via, i.e., 18, 19).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. **Claims 81, 82, 93, 96-101, 112, 119, 126, and 131 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kenan et al. (4,006,967).**

With regard to claim 81, Kenan et al. disclose the claimed invention as set forth above **EXCEPT FOR** an explicit teaching wherein said program characteristics of the configurable programmed holographic structure are modified to maximize the output power, as measured by said power measurement device. However, **Kenan et al.** do provide a general teaching of an output beam from said configurable programmed holographic structure being directed to a power measurement device [viz., photomultiplier tube 48 depicted in Fig. 4; also see column 8, lines 20-28]. It would have been obvious to one having ordinary skill in the art at the time the invention was made to

have modified the method teachings of **Kenan et al.** such that said program characteristics of the configurable programmed holographic structure be modified to maximize the output power, as measured by said power measurement device, for at least the purpose of characterizing the response of said configurable-programmed holographic structure, because it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

With regard to claim 82, the program characteristics that vary with respect to the energy applied to said configurable programmed holographic structure in the method of **Kenan et al.** are the indices of refraction associated with said structure.

With regard to claims 93, 112, 119, and 131, although **Kenan et al.** do not explicitly teach wherein the input optical port and the output optical port comprise a common optical port, such structural provision would have been obvious to one having ordinary skill in the art at the time the invention was made, for at least the purpose of reducing the linear extent of said structure [by utilizing a reflective embodiment], because such a modification would have involved a mere change in size of a component, and a change in size is generally recognized as being within the level of ordinary skill in the art. *In re Rose*, 105 USPQ 237 (CCPA 1955).

With regard to claims 96-101, although **Kenan et al.** do not explicitly disclose wherein the energy introduced is electromagnetic, thermal energy, photonic energy, acoustic energy [see, however, column 5, lines 55-65], nuclear energy, or chemical energy, **Kenan et al.** do explicitly disclose, as detailed above with regard to claim 102, wherein said energy introduced is electrical energy, and because Applicant has not

adduced any criticality with the use of any of these forms of energy with respect to one another, the Examiner submits that the use of any energy suitable energy source would have been obvious to one having ordinary skill in the art at the time the invention was made, for at least the purpose of availing oneself of the broadest possible array of energy sources to power said method.

With regard to claim 126, although **Kenan et al.** do not explicitly disclose wherein the input optical signal interacts with the configurable programmed holographic structure to produce one of an optical signal encoded with multi-level phase shift key coding, and a multi-level phase shift key-decoded optical signal [aka biphase modulation or phase-shift signaling], such encoding and decoding of optical signals is notoriously old and well known in the art of optical communications and thus would have been an obvious design choice for one having ordinary skill in the art at the time the invention was made to have so modified the method teachings of **Kenan et al.**, for at least the purpose of achieving very high spectral efficiency.

3. **Claims 65 and 66 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kenan et al. (4,006,967), as applied to (among others) claim 64, in view of Cullen et al. (6,702,897).**

With regard to these claims, Kenan et al. disclose the claimed invention as set forth above **EXCEPT FOR** explicit teachings wherein said configurable programmed holographic structure comprises a configurable demultiplexer and a configurable multiplexer, respectively.

Cullen et al., however, explicitly disclose the use of Bragg gratings [read: configurable programmed holographic structures] in demultiplexers [please see column 5,

lines 17-22 & and multiplexers [please see column 5, lines 29-38]. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the method taught by **Kenan et al.** such that its configurable programmed holographic structure further comprise, respectively, either a configurable demultiplexer or a configurable multiplexer, **Cullen et al.** providing explicit teachings of same, for at least the purpose of utilizing said configurable programmed holographic structure taught in the method of **Kenan et al.** so as to enable said method to be used in well-known optical communication applications.

Response to Arguments

4. Applicant's arguments filed on 1 November 2004 with respect to the claims have been fully considered but have been rendered moot in view of the new ground(s) of rejection set forth hereinbefore.

Conclusion

5. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any

extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Contact Information

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Craig H. Curtis, whose telephone number is (571) 272-2311. The examiner can normally be reached on Monday-Friday, 9:00 A.M. to 6:00 P.M..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Drew A. Dunn, can be reached at (571) 272-2312. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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C.H.C.
Craig H. Curtis
Group Art Unit 2872
6 January 2005